



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/003,405	12/06/2001	Yong-Ling Ruan	021565-110	5391

7590 12/20/2005
R. Danny Huntington, Esq.
BURNS, DOANE, SWECKER & MATHIS, L.L.P.
P.O. Box 1404
Alexandria, VA 22313-1404

EXAMINER

KALLIS, RUSSELL

ART UNIT PAPER NUMBER

1638

DATE MAILED: 12/20/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/003,405	Applicant(s) RUAN ET AL.	
	Examiner Russell Kallis	Art Unit 1638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 12-30 is/are pending in the application.
- 4a) Of the above claim(s) 4-7 and 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 8-10, 12-17 and 21-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 December 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/29;9/16;9/27</u> . | 6) <input checked="" type="checkbox"/> Other: <u>attached sequence report</u> . |

DETAILED ACTION

Claim 11 is canceled. Claims 1-10 and 12-30 are pending. Claims 4-7 and 18-20 are withdrawn. Claims 1-3, 8-10, 12-17 and 20-30 are examined.

Information Disclosure Statement

The IDS submitted 9/18/2005 has not been entered into the record. The submission contains hyperlinks and is therefore objected to. Further, Applicant should identify each entry by GenBank Accession number, briefly identify the source (i.e. plant species), name the encoded enzyme, and provide the date the accession was made publicly available.

Rejection of claims 1-3, 8-17 and 21-30 under 35 U.S.C. 112, first paragraph, is withdrawn in view of Applicant's amendments and arguments.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-3, 8-10, 12-17 and 20-30 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for a method of altering fiber development or properties, or improving fiber yield or quality, or for increasing seed size in a cotton plant transformed with a plant sucrose synthase and plants and seeds transformed thereby, does not reasonably provide enablement for altering the fiber properties or development, or improving fiber yield or quality, or for increasing seed size of any plant other than cotton. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims.

The claimed invention is not supported by an enabling disclosure taking into account the *Wands* factors. *In re Wands*, 858/F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988). *In re Wands* lists a number of factors for determining whether or not undue experimentation would be required by one skilled in the art to make and/or use the invention. These factors are: the quantity of experimentation necessary, the amount of direction or guidance presented, the presence or absence of working examples of the invention, the nature of the invention, the state of the prior art, the relative skill of those in the art, the predictability or unpredictability of the art, and the breadth of the claim.

The claims are broadly drawn to a method for altering fiber development or properties, a method of improving fiber yield, a method of improving fiber quality, and a method of increasing seed size by providing cells of a plant with a polynucleotide capable of being translated into an active sucrose synthase, and plants and seeds transformed thereby.

Applicants provide guidance for reducing fiber and seed development in cotton transformed with antisense and co-suppression constructs comprising an undefined polynucleotide encoding an unspecified sucrose synthase (Example 1 page 25).

The specification fails to provide guidance for using the other polynucleotides encompassed by the claims that encode an active sucrose synthase that would alter fiber development, improve fiber yield, improve fiber quality, or increase seed size by providing cells of plants with a polynucleotide capable of being translated into an active sucrose synthase. Applicants fail to teach which sucrose synthase encoding polynucleotides would alter fiber development other than SEQ ID NO: 1. Further, Applicant does not teach any increases or

Art Unit: 1638

improvements in fiber quality, or size; or any increases in seed size using any of the sucrose synthases taught in the specification.

The state of the art for transformation of a plant with a sucrose synthase encoding polynucleotide in order to increase or alter fiber development is unpredictable because in many plants sucrose synthase enzymatic activity does not largely impact fiber development or properties. Three isoforms of pea sucrose synthase were cloned and characterized. It was observed in mutants of the pea sucrose synthase that some isoforms were active in the production of starch and others were active in the production of cellulose (Barratt D. et al. Plant Physiology, October 2001 Vol. 127; pp. 655-664; see abstract and page 658, column 2, beginning of new section). Further, different isoforms of sucrose synthase serving separate physiological roles is also seen in other plant species. For example, the corn SS1 isoform of sucrose synthase plays the dominant role in providing carbon for cellulose biosynthesis while SS2 serves to provide carbon precursors for starch biosynthesis (Chourey P. et al. Mol. Gen. Genet. 1998, Vol. 259, pp. 88-96; see abstract and page 89 column 1, last paragraph of the introduction). The above mutants in corn and in pea did not show any altered fiber development or properties but rather are related to starch synthesis (Ruan Y. et al. Plant Physiology, Vol. 115, pp. 375-385; see page 375, column 2 lines 4-17). Since all plants produce fiber, the above mutants in corn or pea indicate that that not all plants would yield altered fiber development or properties or improvements to fiber quality or increased seed size when transformed with a sucrose synthase. Moreover the specification does not support a broad range of plants defined as fiber producing plants other than cotton.

Given the lack of guidance in the instant specification, undue trial and error experimentation would be required for one of ordinary skill in the art to screen through the multitude of non-exemplified fiber producing plants as broadly claimed to encompass any plant by *in vivo* transformation and analysis of fiber properties or development and seed size, in order to identify those plants that when transformed would produce an altered fiber development or properties, or improved fiber yield, improved fiber quality, or increased seed size by providing any plant with a sucrose synthase as broadly claimed.

Therefore, given the breadth of the claims; the lack of guidance and working examples; the unpredictability in the art; and the state-of-the-art as discussed above, undue experimentation would be required to practice the claimed invention, and therefore the invention is not enabled for the full scope of the claims.

Applicant asserts that in view of the declaration of Dr. Arioli the invention is enabled over the full range of plants. The declaration of Dr. Arioli is directed to establishing that the methods taught in the specification enabled the transformation of cotton to overexpress SuSy as set forth in Example 3 of the specification. Although the various isoforms of SuSy appear to work interchangeably, it also appears that there is a requirement for a sufficient physiological context for fiber production in a plant and that the specification provides guidance with respect to cotton and only cotton in this respect (Also see arguments *supra*).

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 22-23 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. The claimed inventions encompass untransformed seeds, which are a product of nature and not one of the five classes of patentable subject matter. Claims 22-23 and are drawn to parts such as seeds of the transformed plant. Due to Mendelian inheritance of genes, a single gene introduced into a parent plant would only be transferred at most to half the male gametes and half the female gametes. This translates into only two thirds of the seeds having at least a single copy of the transgene and one quarter of the seeds would not carry a copy of the transgene. Since the claim encompasses seeds that lack the transgene, the claim encompasses seeds that are indistinguishable from seeds that would occur in nature. See *American Wood v. Fiber Distintegrating Co.*, 90 U.S. 566 (1974), *American Fruit Growers v. Brogdex Co.*, 283 U.S. 2 (1931), *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 33 U.S. 127 (1948), *Diamond v. Chakrabarty*, 206 USPQ 193 (1980).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 8-10, 12-17 and 20-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Conner U.S. Patent 6,080,914 (published 27 June 2000) in view of Ruan Y. *et al.* Plant Physiology, Vol. 115, pp. 375-385 and in further view of Applicant's specification.

The claims are broadly drawn to a method for altering fiber development or properties, a method of improving fiber yield, a method of improving fiber quality, and a method of increasing seed size by providing cells of a plant with a polynucleotide capable of being translated into an active sucrose synthase, and plants and seeds transformed thereby.

Conner teaches transforming cotton seeds and bolls with a sucrose synthase for enhanced sink activity (column 10 lines 1-15 and Claims 6 and 9)

Ruan teaches that SuSy expression controls cellulose biosynthesis in plant cells (page 376 column 1, lines 9-24; and the Abstract and page 383, column 1 first full paragraph to page 384 to the end of the section).

Applicant's specification teaches that a cotton clone encoding SEQ ID NO: 2 (Accession U74588 made public on May 4, 1999; see page 1 of specification and attached sequence report), the constitutive clover stunt virus promoter (page 6 of the specification) and a method of cotton transformation was known in the art (page 25 of the specification).

It would have been obvious at the time of invention to modify the invention of Conner to transform cotton with a construct that directed expression in the ball or seed of a cotton plant. One of skill in the art would have been motivated by the teachings of Conner that cotton ball and seed were useful in the art for transformation in order to modify and increase the storage material therein (i.e. cellulose fibers) and by the knowledge that the genes encoding the enzymes required for fiber production in fiber producing cells of cotton were available and commonly known in

Art Unit: 1638

the art as taught by Raun, and Applicant's specification; and that cotton fiber producing seed cells contain the necessary physiological context for altering fiber production also taught by Ruan, and by the success of cotton transformation techniques and producing endosperm cells of rice seeds that accumulated phytoene; that one of ordinary skill would recognize the above teachings and would have had a reasonable expectation of success in transforming a cotton cotton plant with a SuSy coding sequence that would result in the production of altered fiber or seed size given that diverse patterns of carbon portioning in the developing cotton seed as taught by Ruan; and wherein incorporation of a constitutive clover stunt virus promoter or the cotton SuSy clone encoding the SuSy enzyme of SEQ ID NO: 2 is obvious given the lack of criticality.

All claims are rejected.

Art Unit: 1638

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell Kallis whose telephone number is (571) 272-0798. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anne Marie Grunberg can be reached on (571) 272-0975. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Russell Kallis Ph.D.
December 7, 2005

RUSSELL P. KALLIS, PH.D.
PATENT EXAMINER

A handwritten signature in black ink that reads "Russell Kallis". The signature is written in a cursive style with a large, stylized "R" and "K".

GentCore version 5.1.6
Copyright (c) 1993 - 2004 CompuGen Ltd.

OM nucleic - nucleic search, using sw model

Run on: June 4, 2004, 21:00:05 ; Search time 16233 seconds
(without alignments)
7008.899 Million cell updates/sec

Title: US-10-003-405-1

Perfect score: 2625

Sequence: 1 AGGCTGAGCGCTCTCAC.....tcaaaaaaaaaaaaaa 2625

Scoring table: IDENTITY NUC

Gapop 10.0, Gapext 1.0

Searched: 3470272 seqs, 21671516995 residues

Total number of hits satisfying chosen parameters: 6940544

Minimum DB seq length: 0

Maximum DB seq length: 2000000000

Post-processing: Minimum Match 0%

Maximum Match 100%

Listing first 45 summaries

Database :
1: gb_ba:*
2: gb_htg:*
3: gb_in:*
4: gb_om:*
5: gb_ov:*
6: gb_pat:*
7: gb_ph:*
8: gb_pl:*
9: gb_pr:*
10: gb_ro:*
11: gb_sbs:*
12: gb_sy:*
13: gb_un:*
14: gb_vl:*
15: gb_wa:*
16: em_fun:*
17: em_hum:*
18: em_in:*
19: em_mu:*
20: em_om:*
21: em_or:*
22: em_ov:*
23: em_pat:*
24: em_ph:*
25: em_pl:*
26: em_ro:*
27: em_sbs:*
28: em_un:*
29: em_vl:*
30: em_htg_hum:*
31: em_htg_inv:*
32: em_htg_other:*
33: em_htg_mus:*
34: em_htg_pin:*
35: em_htg_rsd:*
36: em_htg_mam:*
37: em_htg_vrt:*
38: em_sy:*
39: em_hcgo_hum:*
40: em_hcgo_mus:*
41: em_hcgo_other:*

Attached sequence report

score greater than or equal to the score of the result being printed,
and is derived by analysis of the local score distribution.

SUMMARIES

Result No.	Score	Query Match	Length	DB ID	Description
1	2624	100.0	2625	U73588	U73588 Gossypium h
2	1689.6	64.4	2661	AB022092	AB022092 Citrus un
3	1615.6	61.5	2652	VIRUS51	D10266 Vigna radia
4	1602.6	61.1	2682	AF030231	AF030231 Glycine m
5	1577.2	60.1	2738	AF315375	AF315375 Phaseolus
6	1559	59.4	2728	MTRI31943	AJ131943 Medicago
7	1556	59.3	2652	PSA12080	AJ12080 Pisum sat
8	1556	59.3	2760	AF049487	AF049487 Medicago
9	1555.6	59.3	2770	AB018561	AB018561 Citrullus
10	1548.6	59.0	2749	AF079851	AF079851 Pisum sat
11	1539	58.6	2647	VFSUCS	X69773 V.faba faba
12	1539	58.6	2665	VFAUDPQFT	M97551 Vicia faba
13	1499.4	57.1	2906	BD236049	BD236049 Materials
14	1497.8	57.1	2913	BD235993	BD235993 Materials
15	1497.8	57.1	3103	BD262165	BD262165 Compositi
16	1497.8	57.1	3103	AR360950	AR360950 Sequence
17	1486.6	56.6	2427	AX506925	AX506925 Sequence
18	1486.6	56.6	2427	AX651931	AX651931 Sequence
19	1477.6	56.3	2783	AGSUS1	X92378 A.gluclonosa
20	1475.6	56.2	2757	PSA11496	AJ11496 Pisum sat
21	1454	55.4	2725	TOMSSF	L19762 Lycopersico
22	1452.4	55.3	2711	POTSSYN	M18745 Potato sucr
23	1447.6	55.2	2708	LES011319	AJ011319 Lycopersi
24	1447.6	55.1	2701	AY205084	AY205084 Solanum t
25	1442.8	55.0	2429	STU537575	AJ537575 Solanum t
26	1405.4	53.5	2838	AY457173	AY457173 Beta vulg
27	1396.4	53.2	2554	CRSUCSTN	X82504 C.rubrum nr
28	1380.8	52.6	2866	DCRNASS	X75332 D.carota (N
29	1316	50.1	2717	AF263384	AF263384 Saccharum
30	1315.4	50.1	2910	AF412037	AF412037 Bambusa o
31	1313.6	50.0	2771	AK100306	AK100306 Oryza sat
32	1310.2	49.9	2690	AF412038	AF412038 Bambusa o
33	1307	49.8	2774	AF412039	AF412039 Bambusa o
34	1301.8	49.6	2890	AF412036	AF412036 Bambusa o
35	1300.6	49.5	2494	E55472	E55472 Method for
36	1300.6	49.5	3389	AK100546	AK100546 Oryza sat
37	1299	49.5	2702	AK098923	AK098923 Oryza sat
38	1297.4	49.4	2627	OSSUPSHY	Z15028 O.sativa nr
39	1296.2	49.4	2885	TGSUCSY21	X96939 T.gesnerian
40	1295.8	49.4	2781	AK072074	AK072074 Oryza sat
41	1287.6	49.1	2450	AX654790	AX654790 Sequence
42	1287.6	49.1	2451	AX755420	AX755420 Sequence
43	1287.6	49.1	2451	AX755773	AX755773 Sequence
44	1287.6	49.1	2910	AK100334	AK100334 Oryza sat
45	1285.4	49.0	2759	TGSUCSYN1	X96938 T.gesnerian

ALIGNMENTS

RESULT 1
LOCUS U73588 2625 bp mRNA linear PLN 04-MAY-1999
DEFINITION Gossypium hirsutum sucrose synthase mRNA, complete cds.
ACCESSION U73588
VERSION U73588.2 GI:4733945
SOURCE
ORGANISM Gossypium hirsutum (upland cotton)
KEYWORDS Gossypium hirsutum
Bukaryota; Viridiplantae; Streptophyta; Embryophyta; Tracheophyta;
Spermatophyta; Magnoliophyta; eudicotyledons; core eudicots;
rosids; eurosids II; Malvales; Malvaceae; Malvoideae; Gossypium.
REFERENCE
AUTHORS Perez-Grau, L. and Delmer, D.
TITLE Direct Submission

JOURNAL Submitted (07-OCT-1996) Calgene, Inc., 1920 Fifth Street, Davis, CA

9616, USA On May 4, 1999, this sequence version replaced gi:4098126.

COMMENT Location/Qualifiers

FEATURES

Source

CDS

```

1..2625
/organism="Gossypium hirsutum"
/mol_type="mRNA"
/strain="cala SF-2"
/db_xref="taxon:3635"
/feature_type="coding_fiber"
1..2421
/codon_start=1
/product="sucrose synthase"
/protein_id="AAD28641.1"
/db_xref="GI:4735946"
/translation="MAERALRVHSLSRLDELTLARNEILALLSRIEKGKILLOH
HOILIEBPAIPEENRKLKANGAPPEVAKAOEALVLPWVALARPGEWYIRVAV
HALVVELVAEYLHPEKELVDGSGNGLVLEDPENSPSPPTLSKISGVBEVL
NRHLKALPHDKESMHLERLRYHCKGNMNDRIOMLNLOHLYLRABEYIGTL
PPTPCAEFERHPOEIGLERKMDPTARVLEMTOLLDLEADPTCLERIPBV
FNVTILPHGIPADNVLYGPDYGVVYLLDOVRALSENMLRKQGLNTPRIIL
ITRLPAVGTTCQRLKRYGESHDLRVFTEKGIYRKMISREKWPYLETY
EDVAHISKEIHLGTPDLIGKXSDGNVSLALHKLGVCTTALALEKTYPSDIY
MKLEDKYHSCQFTADLPAMNHTDFIITSTFQIAGSKDTVQYSEHTAFLEGLR
VVGIDVDPDKNIVSRGADMEIYFPTERKRLKHPRIIDLITKVENHEILCVL
NDNRKPLITFTPLDRVRLNLTGLVEMCGKPKLELANLVVGSDPKRESKDLERAE
MKMPFLIDKYNLNGSPRMTSSQNRIRNVELRYTICDITGAFOPLVYAFGLTVE
AMTCGLPTFATNGGPALIIHVGSGNFIIDPHGDADILVDFEKKCKDPSMDIT
SGGLKRIEERYTKIYSERLTLGVYGFWMKHSNLERRESRYLEMFLAKRKLA
ESVPLAE"
2608..2625

```

ORIGIN
polya_site

Query Match 100.0%; Score 2624; DB 8; Length 2625;
Best Local Similarity 100.0%; Pred. No. 0;
Matches 2625; Conservative 0; Mismatches 0; Indels 0; Gaps 0;

```

QY 1 ATGGCTGAGGCTGCTCACTCGGCTCAACAGTCTCCGTGAGCCTTTGATGAAACCTT 60
DB 1 ATGGCTGAGGCTGCTCACTCGGCTCAACAGTCTCCGTGAGCCTTTGATGAAACCTT 60
QY 61 CTGCTCAAGAAAGAGATTTGGCTGCTCAAGATCGAGGCAAAAGAAAGAA 120
DB 61 CTGCTCAAGAAAGAGATTTGGCTGCTCAAGATCGAGGCAAAAGAAAGAAAGAA 120
QY 121 ATTCTGCAACCAATCAATTAATCTAGAGTTGAAGCTATCCCTGAAGAAAGAAAG 180
DB 121 ATTCTGCAACCAATCAATTAATCTAGAGTTGAAGCTATCCCTGAAGAAAGAAAG 180
QY 181 AAGCTCGTAATGATGATTTTGAAGATTAAGGCTAGTCAGAAAGCATGTGTG 240
DB 181 AAGCTCGTAATGATGATTTTGAAGATTAAGGCTAGTCAGAAAGCATGTGTG 240
QY 241 CCTCCAGGATGATGCTGCTGCTGCTCAAGGCTGCTGTTGGAGTACATTAGAGTG 300
DB 241 CCTCCAGGATGATGCTGCTGCTGCTCAAGGCTGCTGTTGGAGTACATTAGAGTG 300
QY 301 AATGTTCAACCCCTGTTGTTGAGAACTCACTGTTGTAATCTTCACTTCAAGAA 360
DB 301 AATGTTCAACCCCTGTTGTTGAGAACTCACTGTTGTAATCTTCACTTCAAGAA 360
QY 361 GAGCTGTGTAAGAACTCAATGAAACTTTGTTGAAATGAAATTTGAGCCCTTC 420
DB 361 GAGCTGTGTAAGAACTCAATGAAACTTTGTTGAAATGAAATTTGAGCCCTTC 420
QY 421 AATGATCAATCCCGCCCAACTTTCAAAATCAATGTAATGTAATGTAATGTAATG 480
DB 421 AATGATCAATCCCGCCCAACTTTCAAAATCAATGTAATGTAATGTAATGTAATG 480
QY 481 AATGATCAATCCCGCCCAACTTTCAAAATCAATGTAATGTAATGTAATGTAATG 540
DB 481 AATGATCAATCCCGCCCAACTTTCAAAATCAATGTAATGTAATGTAATGTAATG 540

```

```

QY 541 TTCTCAGAGTCATGTCACAGGCAAGACATGATGTTGAATGACAGAAATTCAGAAC 600
DB 541 TTCTCAGAGTCATGTCACAGGCAAGACATGATGTTGAATGACAGAAATTCAGAAC 600
QY 601 TTGAATGCTCTTCAACATGTTTGAAGAAAGCAGAGAGTATCTTGGTACCTTCTCT 660
DB 601 TTGAATGCTCTTCAACATGTTTGAAGAAAGCAGAGAGTATCTTGGTACCTTCTCT 660
QY 661 GATACACCAATGACCAATTCAGAACACCGGTTCCAGAAATGCGTTTGAAGAGGTTGG 720
DB 661 GATACACCAATGACCAATTCAGAACACCGGTTCCAGAAATGCGTTTGAAGAGGTTGG 720
QY 721 GGTGACACCGCAGAGAGCGTCTGAGATGATCAATCTCTTTGATGATCTTTGAGCA 780
DB 721 GGTGACACCGCAGAGAGCGTCTGAGATGATCAATCTCTTTGATGATCTTTGAGCA 780
QY 781 ACTGATCTCTTCAACCTTTGAGAAAGTTCTTTGAGAAATCCCATGCTTCAATGTTGTG 840
DB 781 ACTGATCTCTTCAACCTTTGAGAAAGTTCTTTGAGAAATCCCATGCTTCAATGTTGTG 840
QY 841 ATTCTCACTCCCAAGGATCTTCTGCTCAAGACAAATGTTTGGGGTATCCCGACACCGGT 900
DB 841 ATTCTCACTCCCAAGGATCTTCTGCTCAAGACAAATGTTTGGGGTATCCCGACACCGGT 900
QY 901 GGGCAGGTTGTTACATCTTGATCAAGTCCGAGCTTTGAGATGAGATGCTCTCTCGT 960
DB 901 GGGCAGGTTGTTACATCTTGATCAAGTCCGAGCTTTGAGATGAGATGCTCTCTCGT 960
QY 961 ATTAAGCAACAGAGACTCAACATCACCCCTGATCTCATTTATTAAGATCTTCTCT 1020
DB 961 ATTAAGCAACAGAGACTCAACATCACCCCTGATCTCATTTATTAAGATCTTCTCT 1020
QY 1021 GATGCTGTGGAACCAACATGCGGTCAACGATTTGAAGAAATGATGAGAGAGACTCG 1080
DB 1021 GATGCTGTGGAACCAACATGCGGTCAACGATTTGAAGAAATGATGAGAGAGACTCG 1080
QY 1081 GATATTTCTGAGTACCTTCAAGACAGAAAGGAAATGTTGGAATATGATCTCAAGA 1140
DB 1081 GATATTTCTGAGTACCTTCAAGACAGAAAGGAAATGTTGGAATATGATCTCAAGA 1140
QY 1141 TTTGAAAAGTCTGGCATATCTTGAACCTTCAACAGAGATGTTGCTCATGAAATCTCC 1200
DB 1141 TTTGAAAAGTCTGGCATATCTTGAACCTTCAACAGAGATGTTGCTCATGAAATCTCC 1200
QY 1201 AAGAGTTGACGGCAGCGCATCTGATCAATGGAACCAACAGCGCAATATCTCTC 1260
DB 1201 AAGAGTTGACGGCAGCGCATCTGATCAATGGAACCAACAGCGCAATATCTCTC 1260
QY 1261 GCTCTGCTGCAATTAATAGGATGATCAAGTGCACATGCGCCATGCTTGGAG 1320
DB 1261 GCTCTGCTGCAATTAATAGGATGATCAAGTGCACATGCGCCATGCTTGGAG 1320
QY 1321 AAGACAAATATCAATCAATATCTATTGGAAGAGCTTGAAGCAAAATCAATTC 1380
DB 1321 AAGACAAATATCAATCAATATCTATTGGAAGAGCTTGAAGCAAAATCAATTC 1380
QY 1381 TCTTGCATTTAAGCTGATCTTTTGAATGAAACCAATCAATCAATCAATCAAT 1440
DB 1381 TCTTGCATTTAAGCTGATCTTTTGAATGAAACCAATCAATCAATCAATCAAT 1440
QY 1441 ACTTTCAGGAATTTGAGAGCAAGCACTGTTGTCATATGAGAGCACTGCT 1500
DB 1441 ACTTTCAGGAATTTGAGAGCAAGCACTGTTGTCATATGAGAGCACTGCT 1500
QY 1501 TTCACTCTTCTGCTCTCAACCGTGTGTAATGATGATGATGATGATGATGATGAT 1560
DB 1501 TTCACTCTTCTGCTCTCAACCGTGTGTAATGATGATGATGATGATGATGATGAT 1560
QY 1561 AATATGTTTCCCTGCTGATGATGATGATGATGATGATGATGATGATGATGATGAT 1620
DB 1561 AATATGTTTCCCTGCTGATGATGATGATGATGATGATGATGATGATGATGATGAT 1620
QY 1621 AGGTGAAGATTCATCTGATGATGATGATGATGATGATGATGATGATGATGATGAT 1680

```

